Transfer of passive immunity in foals

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It is crucial for the newborn foal to obtain antibodies through the dam's milk because, unlike in humans, there is no natural transfer of antibodies through the mother's placenta. This is why it is crucial that your foal receives enough colostrum during the first twelve hours of life.

In this article, Katelyn McNicol from WestVETS explains what happens if a foal fails to obtain adequate levels of antibodies, often referred to as 'failure of transfer of passive immunity', and what can be done to protect the foal against infections, which could include septicaemia, pneumonia, joint infections and diarrhoea to name a few.

The importance of IgG in foals

If you have bred a foal you may have heard about 'IgG', but what exactly does it refer to and why is it so important?

What is IgG?

IgG stands for Immunoglobulin type G (sometimes referred to as 'gamma globulin G'). It refers to a type of antibody produced by the immune system. IgG is vital in the face of challenges from viruses, bacteria and fungi and without it the animal is left vulnerable to overwhelming infection.

In the case of the horse, IgG is not transferred to the foal across the placenta, but rather the foal relies on drinking IgG rich colostrum from the mare to provide them with protection. The foal is born with a competent immune system but it is naïve to the challenges it will face in the world. During the first 4-8 weeks of life a foal will develop their own IgG levels, however, during this time they are relying on the protection afforded by the mare's colostrum. The higher the IgG level of a foal, the higher the protection.

In the 'normal' foaling scenario, the mare will begin to produce IgG rich colostrum in the last 2-3 weeks of gestation. Once born, the foal will rise and begin to suckle within two hours of birth. This is significant for several reasons. Firstly, the mare will only be producing colostrum with high levels of IgG for the first 24 hours of milk let down. Secondly, the foal is only able to absorb the ingested IgG into its circulation during the first 12 hours of life, with maximal uptake occurring within the first 6-8 hours.

Intestinal uptake of IgG is greatest when the foal suckles from the mare compared to if it is bottle fed or tube fed. After this time, any colostrum ingested will provide some local immunity in the gut for up to 18-20 hours, but there will be no further systemic uptake. Assuming the mare has good-quality colostrum, this will provide the foal with the best chance of fending off infections until its own immune system has had time to catch up with the pathogens that will challenge it on a daily basis.

What can go wrong?

Your foal may fail to obtain high levels of IgG for two main reasons: either they have failed to ingest an adequate amount of colostrum during the period of intestinal absorption, or the mare's colostrum is inadequate.

It is crucial that your foal is up and drinking within two hours of life, and thereafter drinks strongly and regularly. A foal that suckles inappropriately, i.e., at the mare's chest, stifles, or the stable walls, may be a 'dummy' foal and may need some medical help in the first few days of life. A foal that stays recumbent or spends very little time drinking may already be septic and will require immediate veterinary attention. If you have any doubt as to whether your foal is acting normally, please call your veterinarian immediately.

A mare may fail to provide colostrum high in IgG for various reasons. She may have run milk before birth. This is significant because, as mentioned above, the colostrum has maximum IgG levels for the first 24 hours of milk let down.

> "Testing your foal's IgG can avert health disasters and should be an essential component of any foaling endeavour.
>
> Some of the tests available include the snap test (pictured), zinc sulphate test, latex agglutination test and CITE test.

Photo courtesy WestVETS

Thereafter, the IgG content of the milk drops dramatically. The mare's milk will have the highest concentration of IgG in the first 6-12 hours of production, which mirrors beautifully the time frame within which the foal can maximally absorb IgG. If your mare is running milk prematurely alternate sources of IgG can be provided, however, please contact your veterinarian, as this can be an indicator of other health issues, such as placentitis.

A mare may produce inadequate IgG levels in her colostrum. This can happen for numerous reasons, but most importantly it is crucial for your mare to be as healthy as possible throughout her pregnancy.

Finally, she may have problems producing milk (agalactia). If you find the foal constantly at the udder and bunting repeatedly there may be a problem with milk production and your veterinarian should be contacted.

What if my foal has a low IgG?

If a foal fails to obtain adequate levels of IgG this is often referred to as 'failure of transfer of passive immunity'. A foal with a low IgG is left highly-vulnerable to infections, such as septicaemia (blood infection), pneumonia, joint infections and diarrhoea, to name a few.

Unfortunately, foals do not handle these insults well and tend to deteriorate spectacularly and rapidly, making any of these an emergency for which your veterinarian should be contacted. If you suspect there is a problem with your foal do not 'wait and see' how they go over the course of a day/night. Intensive care and resuscitation of foals is an expensive process which often carries a guarded prognosis. Early intervention can make all the difference to the survival of your foal.

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Photo courtesy WestVETS

"IgG rich plasma must be administered intravenously.

How do you know if your foal has an adequate IgG level?

It is recommended that every foal has their IgG level tested 12-24 hours after birth. This time frame allows the intestines to absorb IgG from the colostrum, while not leaving the immune-compromised foals vulnerable for too long. There are many tests available which use a sample of your foal's blood. Some tests can be conducted on farm, while others will be conducted at the clinic or sent to a laboratory. Some examples of IgG tests are: snap test (pictured), zinc sulphate test, latex agglutination test and the CITE test.

IgG snap test

An IgG level over 8g/L is ideal to protect the foal from infection. This is not to say that a foal with an IgG above 8g/L will definitely be protected, but rather it has the best chance to counter any challenge. An IgG level between 4-8 g/L will likely provide adequate protection, but many veterinarians will recommend intervention. An IgG level below 4g/L means your foal is vulnerable to infection and intervention is strongly recommended. You may also have your IgG level relayed to you in terms of mg/dL, for example > 800mg/dL is ideal.

Not worth the risk

Relying on the vigour of your foal alone is a dangerous way to measure health and IgG. Some foals can be born septic or quickly develop sepsis after birth. Either way, they may look normal for the first 24 hours after birth and then can deteriorate rapidly. Again, early intervention is best.

What happens if my foal has a low IgG?

At the time of testing, your foal's intestinal route of IgG absorption is closed. If your foal has a low IgG then intravenous administration of IgG rich plasma is required. Following administration, the IgG levels of the foal are tested 12-24 hours later to ensure adequate levels have been achieved. Some foals may require more than one bag of plasma.

Testing your foal's IgG can avert health disasters and should be an essential component of any foaling endeavour.

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ABOVE: Nurses at WestVETS Animal Hospital and Equine Reproduction Centre administer plasma to a septic foal.

ABOUT THE AUTHOR: After graduating with honours in 2009 from the University of Queensland, Katelyn McNicol joined the WESTVets team as a mixed animal veterinarian. Although Katelyn loves all animals, her true passion is horses, being particularly interested in medicine and anaesthesia. Katelyn has also undertaken further study in equine dentistry and she is dedicated to the science of balancing a horse's teeth to enhance health, nutrition and performance.